to the discredit of the subject. In Prof. Tower's chapter this tendency shows itself chiefly in his references to the faulty methods of other investigators (Kammerer, Woltereck, Sumner, and others are mentioned in this connection), although no clear statement is given as to where the fault lies. The objections may be sound, but it is scarcely fair thus to impugn the accuracy of the work of others without making it quite clear in what the inaccuracy consists.

In some of the other chapters the dogmatic attitude appears rather in the form of leading the reader to believe that problems are completely understood when, as a matter of fact, many points with regard to them remain obscure. This is exemplified in Prof. Castle's short account of sex-determination in Rotifers and Daphnids, and more seriously in some of Prof. Davenport's statements about the inheritance of certain characters in man. That the statements are made in a more definite form than is justified by the known facts is doubtless explained by the necessity of making them clear and impressive to an untrained audience, but it is unfortunate that in preparing the lectures for publication more care was not taken to differentiate between facts which are absolutely known, and inferences which do not as yet admit of rigid proof.

In conclusion, it should be mentioned that the last two chapters include a couple of slips which might mislead the reader: on p. 277 *diabetes insipidus* (which appears to be confused with the common diabetes) is correctly placed among abnormalities which appear to be dominant, but it is stated that two normal parents may have defective children; and on p. 286 the statement is made with regard to recessive abnormalities that "two affected parents have exclusively normal children," where affected children is, of course, meant.

(2) Prof. Greil's book is of a very different character. It is an attempt to show that all the phenomena of development, inheritance, and sex-determination can only be properly considered from the point of view of epigenesis. The word "epigenetisch" appears on almost every page, and much dialectical skill is expended in showing that cases in which some form of predetermination appears to be the natural explanation are really epigenetic in character. The motto of one of the chapters—

> "Was du ererbt von deinen Vätern hast,
> Erwirb' es, um es zu besitzen,"

is the central theme of the book—that the germ only receives inherited tendencies, and that these cannot be studied apart from the manner and conditions of their development. In general, this is of course true, but in his treatment of it the author will seem to many readers to carry his thesis to extreme lengths. Since the development of an inherited tendency is a physiological process, it should theoretically be possible to induce a similar physiological process without any inherited tendency; therefore the inheritance of acquired characters must be possible in certain cases. Although in some cases the presence of a specific sex-chromosome causes the individual to become of one sex, in the absence of a sex-chromosome influences which bring about the same physiological condition in embryonic life will also cause it to be of that sex. Telegony must exist, because the bearing of young of a different breed must cause the mother to become "in a certain sense a hybrid." The whole hypothesis of Mendelian factors must be given up because it savours of preformationism rather than epigenesis. To summarise chapters in sentences of this sort is perhaps scarcely doing the author justice, but they give a fairly accurate idea of his attitude.

The book suffers from the absence of headings to chapters or paragraphs; there is no table of contents and an entirely inadequate index, so that it is very difficult to find out in what part of the book any given subject is treated. The style also is overloaded and difficult to follow. The last 130 pages are devoted to a critical account of theories of heredity, closely printed in exceedingly small type. L. DONCASTER.

PHOTOGRAPHIC ANNUALS.

(1) *The British Journal Photographic Almanac and Photographer's Daily Companion,* 1913. Edited by George E. Brown. Pp. 1448. (London: Henry Greenwood and Co., n.d.) Price: cloth, 1*s.* 6*d.* net; paper, 1*s.* net.

(2) *The American Annual of Photography,* 1913. Edited by Percy Y. Howe. Pp. 328. (New York: George Murphy, Inc., 1912.) Price 75 cents.

(1) ABOUT this time of the year nearly every photographer places on his bookshelf the 1912 edition of his B.J. Year Book, probably well ear- and thumb-marked, and becomes possessor of the 1913 issue, a volume of about equal size and weight. The current work, which is the fifty-second issue, covers 1448 pages, but of these about two-thirds are advertisements, and, as experience has shown, are most useful to both professional and amateur photographers. While the general contents of this well-known annual need no special reference, some notable items in the present issue deal with the important subject of the fitting up of the dark-room by the editor, an excellent and thoroughly practical article on methods of telephotography by Capt. Owen Wheeler, and 120

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hints in picture form of "how to do it," being a useful set of wrinkles for the beginner.

Space does not allow us to do more than name such useful items as the year's progress, working formulæ, tables of various kinds, &c., as are brought together in this storehouse of photographic information. Excellent indices make it quite easy to find anything contained in the volume, and the usual price of one shilling makes the issue available to everyone.

(2) The second book has for its object the presentation of a selection of articles on current photographic topics combined with reproductions of numerous specimens of photographic work.

The editor evidently had a very large amount of material to handle, and his selection contained in this volume should meet the requirements of most photographers. The list of contributors is quite large, and the subjects dealt with exceedingly varied, so that the volume forms a series of short essays on many very useful hints in different branches of the subject. The illustrations are good throughout, and the frontispiece is a fine reproduction on buff linen. The last portion of the book is devoted to a typical collection of formulæ and tables selected from the working methods of practical photographers.

OUR BOOKSHELF.

Studies in Light Production. By Dr. R. A. Houston. Pp. iii + 115. (*The Electrician* Series.) (London: *The Electrician* Printing and Publishing Co., Ltd., n.d.) Price 5*s*. net.

THE publication in one volume of Dr. Houstoun's papers on artificial illumination will be welcomed by all those interested in that subject. The collection consists of ten chapters which have appeared in *The Electrician,* together with two others. It may at once be said that the contents are not only extremely interesting, but will also serve as a useful and important handbook for lighting engineers.

The intention of the author has been to collect information respecting the various illuminants at present in use for purposes of comparison and with the view of suggesting the lines upon which future progress may be made. Thus we find following the first two chapters (which are devoted to the consideration of the energy spectrum and the black body) a chapter on each of the following light sources: flames, the Welsbach mantle, the carbon glow-lamp, the arc, the Nernst lamp, metallic filament lamps, and the mercury arc. Comparisons of the luminous and radiant efficiencies are given, showing how great improvements in these have been made in recent years. In chapter x. the author discusses the question of the light of the future particularly with reference to the possible use of vacuum tubes containing nitrogen, or, according to Claude, neon by preference. Some very striking figures are given which certainly seem to indicate the probability of great saving of energy by this mode of lighting. Attention is also given to fluorescence, and, although the author advises caution in this case, this also may some day be used.

Chapter xi. is a reproduction of Dr. Houstoun's Royal Society paper on the absolute measurement of light, the proposal being to measure light by means of a thermopile which receives the energy surviving the passage through a suitable filter, *i.e.* one which cuts off the infrared and ultraviolet and is transparent to the various luminous radiations in proportion to their visibilities. Since, however, the data required for this can only be obtained by visual observation, this light measurer is not really independent of the human eye, and therefore scarcely surmounts the colour difficulties experienced in ordinary photometric measurements.

Modern Mine Valuation. By M. Howard Burnham. Pp. xi + 160. (London: Charles Griffin and Co., Ltd., 1912.) Price 10*s*. 6*d*. net. (Griffin's Mining Series.)

IN this book the author discusses the fundamentals of mine valuation—a subject too seldom ventilated and too little introduced into the training of mining engineers.

The subject is treated mathematically. The less secure an investment, the greater the interest required; the less an ore-body is disclosed, the greater the insecurity and the greater the interest demanded. According to the author, every occurrence of ore, whether it be but an outcrop untouched or whether it be an underground block honeycombed with exposures, may, by the application of a "risk rate" especially applicable to its condition, be valued mathematically and logically. The descriptions of "positive," "probable," and "possible," as applied to statements of ore-reserve, disappear by this method; each block becomes rated at a present value corresponding to the rate of interest demanded by its sufficiency or insufficiency of exposure. Into this calculation, also, deferment is entered until the mathematical formulæ will overwhelm the mining engineer who took to mining under the idea that observation was the one important faculty to cultivate.

The procedure in calculating the results of sampling is also carefully discussed, and towards the end many useful tables of present values, at various rates of interest, are given. Most of the first portion of this book appeared in *The Mining Magazine* late last year, when its value was increased by the discussion forthcoming from various engineers.

Although some of the views expressed and the novel mathematical treatment may not command entire agreement from his colleagues, they are all assured that his work can only result in putting the purchase and sale of mines upon a more logical footing. A careful reading of this book, though it may be hard to many, will be of interest and benefit to mining engineers generally, each of whom, at some time or another, will find application for some of the points elaborated.

S. J. TRUSCOTT.

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